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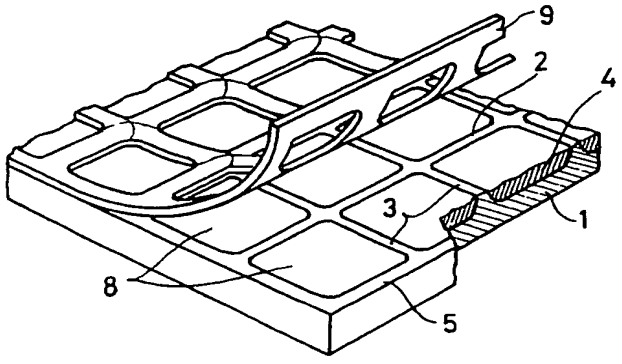
(54) Process of electroforming a screen, more particularly a cylindrical screen and screen obtained by applying said process.

(57) Metal screen comprising ribs 7 and apertures 6 and process of electrolytically forming a metal screen by forming in a first electrolytic bath a screen skeleton 9 upon a matrix 1 provided with a separating agent, such as beeswax, stripping the formed screen skeleton 9 from the matrix 1 and subjecting the screen skeleton to an electrolysis in a second electrolytic bath in order to deposit metal onto said skeleton 9. The second electrolytic bath contains an organic compound having at least one unsaturated bond not belonging to a $=C-\overset{\|}{S}=O$ group. Preferred organic compounds are a butyne diol or an ethylene cyanohydrin. The screen is preferably a cylindrical screen.



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Process of electroforming a screen, more particularly a cylindrical screen and screen obtained by applying said process.

The invention relates to a process of electrolytically producing a screen by forming a screen skeleton upon a matrix in a first electrolytic bath, subsequently stripping the formed screen skeleton from the matrix and by subjecting said screen skeleton to an electrolysis in a second electrolytic bath in the presence of at least one brightener.

A process of this type for producing a screen, is known in the art. In this known process a screen skeleton is produced upon a matrix provided with a stripping means, such as beeswax, the structure of said matrix corresponding with that of the screen to be produced; the screen skeleton being obtained by a deposit of metal, whereupon the thin skeleton is stripped from the matrix and is finally subjected to an electrolysis, in the presence of a brightener, if any. In this process electrolytic baths are used, comprising nickel salts and eventually brighteners of the first class, the molecules of which contain a $=C-\overset{\overset{O}{\|}}{\underset{\underset{O}{\|}}{S}}=O$ group, examples of which are e.g. sulfonic acids, mono- and dibasic sulfonic acids, sulfonic acid esters, sulfonamides, sulfonimides, sulfinic acids and sulfones.

A great disadvantage of said known process is that the dimensions of the lands in the screen skeleton will grow throughout by the nickel deposit, causing said lands to obtain a round cross section, which will give rise to a restriction of the size of the apertures in the screen to be produced, so that the passage of said screens is hampered.

The present invention aims to provide a process for electrolytically producing a screen, which process does not present said disadvantage, and in which process particularly the increase of the deposit of metal upon the screen skeleton occurs in a plane being perpendicular to the surface of the screen. It is attained in this manner that the width of the openings or apertures in the screen skeleton will decrease less rapidly, while a strong screen is formed, as the lands present in the screen skeleton are strengthened by deposits occurring perpendicular to the screen surface.

This object is achieved in accordance with the present invention in that a means is added to the second electrolytic bath, comprising at least an organic compound having at least one unsaturated bond, not belonging to a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group, thus that growth of deposits perpendicular to the surface of the screen skeleton is improved.

It has appeared surprisingly that some brighteners particularly improving a strong deposit growth in the plane of the screen skeleton upon a matrix, will not give rise to a particular deposit in the plane of the screen skeleton when said skeleton is placed in an electrolytic bath, but that said

deposit growth will then occur in a plane perpendicular to the surface of the screen skeleton, involving all the advantages inherent therewith. Brighteners of this type are known in the art as so-called "levelling agents" or brighteners of the second class.

Very conveniently unsaturated organic compounds are used, comprising at least a double or a triple bond, provided that said double or triple bond does not belong to a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group.

Compounds which may be suitably applied in the process according to the invention, are a butyne diol or an ethylene cyanohydrin.

When the latter compounds are applied an optimum growth of deposits upon the lands in the screen skeleton perpendicular to said screen skeleton, will occur.

In a preferred embodiment of the process in accordance with the invention a cylindrical screen is produced by forming a screen skeleton upon a cylindrical matrix in a first electrolytic bath, by stripping said screen skeleton from the matrix and by subsequently subjecting the screen skeleton to an electrolysis in a second electrolytic bath.

On producing cylindrical screens of this type, the matrix advantageously comprises a beeswax as a stripping means.

The invention also relates to a screen obtained by electrolytically forming a screen skeleton upon a matrix in a first electrolytic bath, subsequently stripping said formed screen

skeleton from the matrix, and by subjecting said screen skeleton to an electrolysis in a second electrolytic bath, in the presence of at least one brightener, said screen being characterized in that a means has been added to the second electrolytic bath, which means comprises an organic compound having at least one unsaturated bond, not belonging to a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group, thus that the growth of the deposits perpendicular to the surface of the screen skeleton is improved.

The invention particularly relates to a screen obtained by electroforming a screen skeleton upon a matrix in a first electrolytic bath, stripping said screen skeleton from said matrix, and by subjecting said screen skeleton to an electrolysis in a second electrolytic bath, in the presence of at least one brightener, whereby an organic compound is used, comprising at least a double or a triple bond, provided that said double or triple bond does not belong to a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group. Very conveniently the abovementioned screen according to the invention is obtained by applying a butyn diol and/or an ethylene cyanohydrin as an organic compound.

The invention furthermore relates to a screen, more particularly a cylindrical screen, obtained by applying the process in accordance with the present invention.

The present invention will be illustrated by way of example only, on the basis of an embodiment in the drawing, wherein:

- Fig. 1 is a schematic view of the manner in which a screen skeleton is stripped from a matrix;

Fig. 2 is a cross section of the stripped off screen skeleton;

Fig. 3 is a section through a screen obtained from a screen skeleton, by subjecting said skeleton to an electrolysis in the presence of a compound, according to the invention;

Fig. 4 is a cross section through a screen formed upon a matrix in the presence of a compound, according to the invention;

Fig. 5 is a section through a screen obtained from a screen skeleton by subjecting the screen skeleton to an electrolysis in a bath comprising nickel salts, and brighteners of the first class, if any, and not a compound according to the invention.

Fig. 1 shows a matrix 1 consisting of a plate 1 of electrically conductive material, e.g. nickel. Said plate comprises depressions 8 formed by etching, while separating said depressions by means of ribs 2, 3. The depressions 8 are filled with a di-electric material, such as e.g. an asphaltmaterial or a bituminous material 4.

The separating or stripping ribs 2 and 3 have previously been provided with a layer of beeswax 5, in order to facilitate a subsequent stripping of the formed screen skeleton from the matrix.

It will be obvious that on placing plate 1 as a cathode in an electrolytic bath together with a suitable anode and an electric source, a deposit will be formed upon the ribs 2, 3. The

screen skeleton formed in this manner therefore comprises lands 6 and 7 running transversely with respect to one another.

If the plate 1 with the screen skeleton 9 formed thereon, is subsequently placed in an electrolytic bath comprising brighteners of the first class, that is to say brighteners in the form of e.g. an alkyl naphthalene sulfonic acid, naphthalene disulfonic acids, diphenyl sulfonates or the like compounds, together with an acetylene alcohol (a compound as used in the invention) a screen is finally obtained, the lands of which preferably have been grown in the direction of the surface of the screen, while decreasing the dimensions of the openings or apertures of the screen (see fig. 5).

When the formed screen skeleton, if the latter is still very thin as yet, is stripped from the matrix, and is suspended in an electrolytic bath as a cathode, in the presence of an acetylene alcohol, the surprising effect can be observed that the growth of deposits upon the lands will preferably occur in a direction perpendicular to the screen skeleton surface.

Similar results may also be observed with varying organic unsaturated compounds, known in the art as brighteners of the second class.

EXAMPLE I

Upon a nickel plate 1, comprising the desired screen pattern and being provided with beeswax as a separating agent, a screen skeleton is deposited by means of electrolysis. Said

screen skeleton is removed when the thickness of the lands in the screen skeleton amounts to 30 micron.

The obtained screen skeleton of nickel metal is subsequently suspended in an electrolytic nickel bath as known in the art and as a cathode, subjected to an electrolysis.

Said electrolysis is carried out in the presence of an organic compound, comprising a triple bond in the molecule, apart from a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group, if present. The compound in this case consists of ethylene cyanohydrin, comprising a triple bond between the carbon and nitrogen atom.

In this manner a screen is obtained which is provided with excellent large openings, the dimensions of which are not or only slightly, smaller than the openings as present in the screen skeleton.

When the experiment is repeated by placing the plate with the skeleton grown thereon, in a nickel bath, in the presence of the same compound, a screen is obtained, the thickness of which corresponds with that of the firstmentioned screen, the openings of the second screen, however, being smaller, due to a deposit of nickel, preferably in the direction of the surface of the screen.

EXAMPLE II

Example I is repeated, but the plate is replaced by a cylinder, having a chromium surface. The cylindrical screen is removed when the thickness of the lands in the screen skeleton amounts

for instance to 30 micron.

In this manner a cylindrical screen is obtained comprising excellent large openings, the dimensions if which are not, or only slightly, smaller than those in the screen skeleton.

CLAIMS

1. Process of electrolytically producing a screen by forming a screen skeleton upon a matrix in a first electrolytic bath, subsequently stripping the formed screen skeleton from the matrix and by subjecting said screen skeleton to an electrolysis in a second electrolytic bath in the presence of at least one brightener,
characterized in that
a means is added to the second electrolytic bath, comprising at least an organic compound having at least one unsaturated bond, not belonging to a $\equiv C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group, thus that the growth of the deposits perpendicular to the surface of the screen skeleton is improved.

2. Process according to claim 1, characterized in that an organic compound is used, comprising at least a double or triple bond, provided that said double or triple bond does not belong to a $=C-\overset{\overset{O}{\|}}{\underset{|}{S}}=O$ group.

3. Process according to claims 1 or 2, characterized in that a butyne diol is added.

4. Process according to claims 1 or 2, characterized in that an ethylene cyanohydrin is added.

5. Process according to any one or more of the preceding claims, characterized in that, a cylindrical screen is produced by forming a screen skeleton upon a cylindrical matrix in a first electrolytic bath, by stripping said screen skeleton from the matrix and by subsequently subjecting said screen

skeleton to an electrolysis in a second electrolytic bath.

6. Process according to any one or more of the preceding claims, characterized in that, the screen skeleton is formed upon a matrix being provided with a very thin layer of a separating agent, such as beeswax.

7. Screen, more particularly a cylindrical screen, obtained by applying the process according to any one or more of the preceding claims.

8. Screen, more particularly a cylindrical screen, obtained by electrolytically forming a screen skeleton (9) upon a matrix (1) in a first electrolytic bath, subsequently stripping said formed screen skeleton from the matrix and by subjecting said screen skeleton to an electrolysis in a second electrolytic bath, in the presence of at least one brightener, characterized in that, a means has been added to the second electrolytic bath, which means comprises an organic compound, having at least one unsaturated bond, not belonging to a $=C-\underset{|}{\overset{\overset{\|}{S}}{}}=O$ group, thus, that the growth of the deposits perpendicular to the surface of the screen skeleton (9) is improved.

9. Screen, according to claim 8, characterized in that, the organic compound comprises at least a double or triple bond, provided that said double or triple bond does not belong to a $=C-\underset{|}{\overset{\overset{\|}{S}}{}}=O$ group.

10. Screen according to claims 8 or 9, characterized in that, the organic compound is a butyne diol and/or an ethylene cyano hydrin.

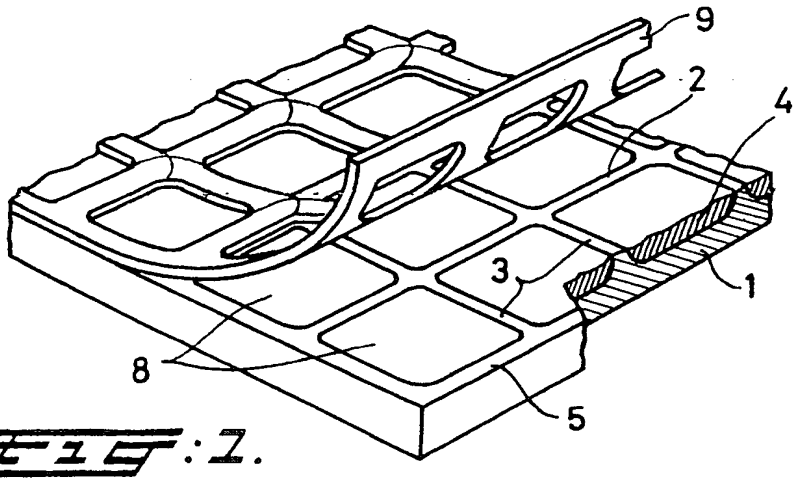

Fig:1.

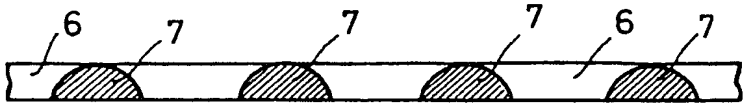

Fig:2.

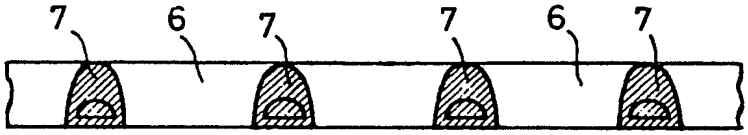

Fig:3.

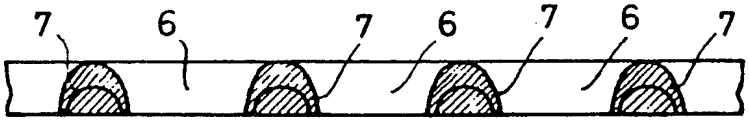

Fig:4.

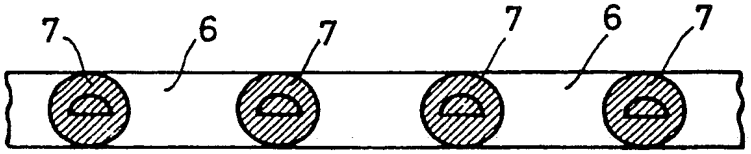

Fig:5.

European Patent Office

EUROPEAN SEARCH REPORT

0038104

Application number

EP 81 20 0423

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	DE - A - 2 540 434 (BRAUN A.G.)	
A	SPIRO: "ELECTROFORMING" Robert Draper 1968 pages 180-183 TEDDINGTON (GB)	
A	HET INGENIEURSBLAD, vol. 45, no. 9, 1976 S.A. WATSON: "Recent developments in electroforming and backing mould cavities" pages 279-286 * page 282 *	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

C 25 D 1/08

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

C 25 D 1/08

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	01-07-1981	NGUYEN THE NGHIEP

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